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PROPOSAL FOR AN INTERIM AMBIENT AIR QUALITY CRITERION FOR INHALABLE PARTICULATE MATTER (PM10)

ONTARIO MINISTRY OF ENVIRONMENT AND ENERGY

STANDARDS DEVELOPMENT BRANCH

MAY 21, 1997

Inhalable particles are very small solids or liquid aerosols that vary in size and chemical composition. Those ranging in size up to 10 micrometers (microns) in diameter are referred to as PM10. PM10 particles can be made up of many constituents including sulphates, nitrates, elemental carbon, organic compounds, metals and soil dust. This variability in composition reflects the source of the material. PM10 particles are easily inhaled and the smaller size particles (those less than 2.5 microns) can travel to and affect the deepest part of the respiratory tract.

Ambient levels of PM10 result from particles that are emitted directly into the atmosphere (*primary* particles) or from those formed by reactions of gaseous pollutants in the atmosphere (*secondary* particles).

The major sources of *primary* particles include fossil fuel combustion (vehicles, power generation and other sources), road dust, construction activity and many industrial processes. *Secondary* particles result whenever atmospheric reactions of precursor gases produce products of low volatility. Examples include: oxidation of sulphur dioxide to sulphuric acid, which readily forms particulate salts (sulphates) in the atmosphere with ammonia or metals and their oxides. Gaseous oxides of nitrogen can be similarly converted to nitric acid and its salts, which also exist mainly as particles (nitrates). Certain volatile organic compounds can also be converted into particulate form (secondary organic aerosols) following reaction with ozone or hydroxyl radicals in the atmosphere.

Numerous recent epidemiological studies have linked PM10 exposures with serious health effects ranging from respiratory and cardiac symptom-related hospital admissions to premature mortality. PM10 has also been linked with other morbidity effects like asthma symptoms and chronic bronchitis. The linkage with health effects has been clearly demonstrated when PM10 concentrations exceed about 25 ug/m3, with some evidence suggesting the effects can occur at even lower PM10 concentrations. Although there is still some scientific uncertainty at the lower end of the range, there is now general consensus that there is no clear threshold for health effects. This was further supported in 1995 when the World Health Organization (WHO) considered the health impacts of PM10 and concluded that there was no air concentration that could be judged a threshold; rather, the database on particulate matter suggests a continuum of effects with increasing exposure.

MOEE is currently working in partnership with Environment Canada, Health Canada and other Canadian provinces to develop both PM10 and PM2.5 air quality objectives. However, as announced in a March 14, 1997 press release in which Ontario provided its comments on the U.S. EPA's air standard proposals and recognizing the serious threat that PM10 poses to human health, MOEE has decided to establish an interim ambient air quality criterion (AAQC) for PM10 in Ontario. This interim AAQC is being set at a level now in effect in several jurisdictions, including the United Kingdom, the State of California. It is also consistent with the interim PM10 guidelines in the Provinces of British Columbia and Newfoundland.

The interim AAQC will serve as Ministry policy to provide guidance for environmental protection decisions in Ontario and as an interim goal for assessing the effectiveness of ongoing and future Inhalable Particulate/Respirable Particulate (IP/RP) initiatives as part of Ontario's SMOG Plan.

The existing Point of Impingement (POI) for Total Suspended Particulate (TSP) which appears in Reg. 346 and the AAQC for TSP in Reg. 337 will be retained.

The interim PM10 AAQC will be evaluated in the context of the national objective once the latter has been finalized.

Interim Ambient Air Quality Criterion (AAQC) for PM10 = 50 ug/m3 (24 hour Average)



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